

XXII. *A revision of the genus Argynnis.* By HENRY J. ELWES, F.L.S., F.Z.S., &c.

[Read September 4th, 1889.]

THE genus *Argynnis* is one that I should consider as highly typical of the palaearctic region, in every part of which it is found; and usually as a genus dominant both in number of species and individuals. Though not quite strictly confined to the region, yet there are good reasons for considering the little group which occurs in Chili as aberrant, and only two species inhabit tropical regions. In the Old World the only subregions which seem deficient in *Argynmidæ* are the Mediterraneo-Persic and the Mongolian, whilst in North America the distribution of the genus is confined to those parts which have a severe winter climate, and it is in consequence absent in the Gulf States and Texas, and scarce in the more arid regions of New Mexico, Arizona, and Colorado.

The difficulties in this genus are not so great as in *Colias* and *Erebia*, except in the species inhabiting the Rocky Mountain and Pacific States of North America, which run into each other in a most extraordinary manner. Most of the European species, though closely allied to each other, are very fairly distinct, and I have only marked one species out of America as doubtful.

I regret to have to differ so often from Mr. W. H. Edwards, who has done so much to make the butterflies of his country known to science; but though his later views, as expressed in such papers as he has written on *Pieris napi* and its vars., 'Papilio,' vol. i., p. 86, and on *Lycæna pseud-argiolus*, give evidence of a correct appreciation of the variation of species, he has in his earlier years created a great number of synonyms which I am sure he will one day regret.

I intended to have published this paper some years ago, but was stopped by the difficulty of understanding the American species. But having last year had the

opportunity of visiting most of the principal collections in the United States, and finding that there seemed to be no prospect of getting a better knowledge at present, I have thought it better to publish the notes I have made, which are based on a study of very complete materials.

My own collection contains specimens, mostly in fair series, of every species except *astarte*, *eugenia*, *columbia*, *inornata*, and *carpenteri*, and I have seen the types of the first three of these, whilst I cannot recognise the last two as species.

I do not expect to see any addition of importance to the genus, as the regions which they inhabit, excepting Arctic and North-eastern Asia, are pretty well known, but the life-history of most of the species is still unknown, and Northern and Central China may perhaps add some species to the list.

In the abbreviations of my synopsis I have followed Staudinger and Edwards' catalogue pretty generally, so that a reference to one or the other of them will explain any which may not be generally understood.\*

The genus *Argynnis* was founded by Fabricius in 1807. Hübner, in the 'Verzeichniss Bekanter Schmetterlinge' in 1816, divided it into five sections, based on the shape of the wings and the colour of the under side, and included insects of other genera such as *Melitæa* and *Agraulis*.

Ochsenheimer, in the 'Schmetterlinge von Europa,' vol. iv., p. 16, in 1816, first properly defined it, and Doubleday, in his 'Genera of Diurnal Lepidoptera,' considers him the author of the genus. Its characters are given by Doubleday in full, and the following remarks made:—"The two sections composing this genus appear to me to be too closely allied to admit of their separation into distinct genera as I once thought advisable. The only constant difference is in the position of the subcostal nervules; for, though generally the species of the first section (*Argynnis*) differ slightly in the form of the palpi from those of the second (*Brenthis*), yet this difference is not constant. Moreover, as Westwood has remarked, the form of the palpi does not appear to be a character always to be relied on in this and the following genus."

\* An asterisk after a reference signifies, as in Edwards's Catalogue, that it refers to the preparatory stages of the insect.

Most other authors have adopted the same view, in which I quite concur, because the position of the subcostal nervules is not the same in all the species of either section, and some, as *A. daphne*, *A. hecate*, *A. gemmata*, and *A. altissima*, have the second branch of the subcostal nervule given off so close to the end of the cell that it can hardly be said to which group they belong; while *A. clara*, which by de Nicéville is included in the first section of *Argynnis*, is in my opinion more closely allied to *gemma* than to any other, and has the second branch emitted beyond the cell. The South American species have the venation as in *Brenthis*, and except *modesta*, Blanch., differ from all the European species in the straight or slightly concave fore margin of the hind wings. *Lathonia* and *bellona* have somewhat the same shaped fore wings, but *epithore*, which is undoubtedly very near to, if not a variety of, *bellona*, has the usual shape of the outer margin, and some specimens of *bellona* seem intermediate.

Scudder has founded a new genus *Speyeria* for *A. idalia*, but as the description is not comparative, and extends over two closely-printed quarto pages, it is not easy to see in what it differs from *Argynnis*, except that the second subcostal nervule is emitted "at the end of the cell, or a little within the extreme limit of its upper border, which is here pushed outward a little" instead of before it, as in *Argynnis*, or beyond it, as in *Brenthis*, both of which he adopts as genera.

On examining my eight specimens of *idalia*, however, I find that in all of them the second subcostal nervule is emitted distinctly before the end of the cell, not so much perhaps as in some *Argynnis*, but more than in others. And the grouping of species on such a character as this will lead to such impossible results, from all other points of view, and especially from that of their geographical distribution, that I cannot accept it, and prefer to retain all the species in one genus.

Moore, in the 'Lepidoptera of Ceylon,' has adopted Hübner's name *Acidalia* for *A. niphe*; as usual, without giving the points of difference between it and *Argynnis* proper; and though perhaps it has a different aspect to any other species, and by its geographical distribution is a tropical insect, I think it best to keep it in the genus.

With regard to the Chilian species, I am more doubtful. They seem by their shape and venation to be nearer to *lathonia* than any other species, but their under side is quite peculiar in marking, and moreover the different species are not very similar in type.

Genus ARGYNNIS, *Fabr.*, Ill. Mag., vi., p. 283 (1807); Ochs., Schmett. Eur., iv., p. 16 (1816); Doubl. Hew., Gen. Di. Lep., i., p. 171 (1848).

BRENTHIS, *Hb.*, Verz., 30 (1816); SPEYERIA, *Scudd.*, Syst. Rev., 23.

APHIRAPE, *Hb.*, 23—25 (1798?).

*Germ.*; *Bav. Belg.*  
*or.*; *Ross c.*; *Arm.*  
*Lap.*; *Ross. bor.*;  
*Amur sup.*; *Hudson Bay, Labrador.*

var. *inconstans ossianus*, *Hbst.*, x., p. 98, t. 270, 4, 5 (1800); *Schilde*, S. E. Z., 1872, p. 175\* (typ. minor, supra obscurior, subt. mac. albis sive argenteis).

var. *inconstans tricularis*, *Hb.*, Zutr., vol. ii., t. 19; *Edw.*, Cat., No. 142 (1885); *ossianus*, *Boisd.*, Ic., 19, 1, 3 (typ. minor, supra dilutior, subt. mac. albis sive luteis).

*Amur inf. (Graeser)*; *Colorado, 10,000 ped. alt.*; *Rocky Mts. alp.*

HEGEMONE, *Stgr.*, S. E. Z., 1881, p. 292; *Alph.*, Lep. Kuldj., p. 74, t. xv., 16, ♂, 17, ♀.

*Alatau, Thian-shan, Margilan, 4—6000 ped. alt.*

SELENE, *Schiff.* S. V., p. 321; *Hb.*, 26, 27; *Buckl.*, Ent. Mo. Mag., vii., p. 114, 1869.\*

*Eur. (excl. And. Sard. Cors. et Græc.)*; *Arm.*;  
*Alt.*; *Asia bor. et or.*; *Korea.*

? var. *hela*, *Stgr.*, S. E. Z., 1861, 347. (minor, supra obscurior, nom. vix conservandum).

*Scand. bor.*; *Asia bor. ad 68° N.*

OSCARUS, *Ev.*, Bull. Mosc., 1844, iii., 588, t. 14, 1, a b.

*Prov. Irkutsk*;  
*Amur sup. et inf. Vladivostock.*

var. *australis*, *Graes.*, Berl. Ent. Zeit., 1888, p. 90 (major, pallidior, minus distincte notata, *fide* Graeser).

IPHIGENEIA, *Graes.*, Berl. Ent. Zeit., 1888, p. 90 (? bona sp., an transitus ad *euphrosyne* vel *selene*).

*Nikolaïevsk (Amur inf.)*; *Korea.*

? *Brenthis perryi*, *Butl.* Ann. Nat. Hist., 1882, p. 16.

\* In referring to Edwards's Catalogue, I mean the Revised Catalogue, issued as a separate publication by the American Entomological Society, Philadelphia, 1885.

- EUPHROSYSNE, *Linn.*, S. N., x., 481; *Esp.*, 18, 3, 72, 3. *Eur. (exc. Ib. Sic. Sard. Cors.); Arm. Alt.; Asiabor. ad. 70° N.; Amur sup. et inf. Scand. cent. et bor.; Alps (varius).*
- var. et ab. *fingal*, *Hbst.*, x., p. 92, t. 270, 1, 3 (minor obscurior). *U. S. Am. bor. or.; Brit. Am.; Rocky Mts.; Alaska.*
- MYRINA, *Cram.*, Pap. Ex., ii., t. 189, B, c (1779); *Edw.*, Cat., p. 30; *Edw.*, Can. Ent., i., 55 (1869); *Scudd.*, Butt. N. E\*, p. 593, t. 4, 5. *Sikkim bor. sum. alp.*
- ALTISSIMA, *Elwes*, P. Z. S., 1882, p. 403, t. xxv., 8, ♂; de Nicé., Butt. Ind., ii., p. 139. *Sikkim bor. alp.; Ladak or.?*
- GEMMATA, *Butt.*, Ann. Nat. Hist., 1881, vii., p. 32, t. iv, 1; *Elwes*, P. Z. S., 1882, p. 404, t. xxv., 6, ♂, 7, ♀; de Nicé., Butt. Ind., ii., p. 138. *Prov. Gurjhal (N. W. Him.), 12,000 ped. alt.; ? Kashmir.*
- CLARA, *Blanch. Jacquem.* Voy. iv. p. 20, Ins. t. ii., 2, 3 (1844); de Nicé., Butt. Ind., ii., p. 136. *Kashmir 8—12,000 ped. alt.*
- JERDONI, *Lang*, Ent. Mo. Mag., v., p. 34 (1868); de Nicé., Butt. Ind., ii., p. 140. *Tibet or.*
- GONG, *Oberthür*, Et. Ent., ix., p. 15, t. 2, 9. *Alp. Pyr. Eur. bor. Asia cent. ad 69° N.; Himalaya, occ. et or. mont.*
- PALES, *Schiff.*, S. V., p. 177; *Hb.*, 34, 35. *Alp. Pyr. Eur. bor. Asia cent. ad 69° N.; Himalaya, occ. et or. mont.*
- sipora*, Moore, P. Z. S., 1874, p. 568, t. 66, 11; de Nicé., Butt. Ind., ii., p. 139, t. xviii., 72, ♂.
- baralacha*, Moore, P. Z. S., 1882, p. 242, t. ii., 1, 1a.
- var. et ab. *isis*, *Hb.*, 38, 39, ♂; ab ♀ *napæa*, *Hb.*, 757, 8 (inconstantes nom. vix conservanda).
- var. *generator*, *Stgr.*, S. E. Z., 1886, p. 235. *Turkestan mont.; Ladak.*
- var. *caucasica*, *Stgr.*, Hor. Ross., 1870, p. 61. *Cauc. mont.; Arm. mont.*
- var. *græca*, *Stgr.*, l. c., p. 62, t. 1, 4. *Græc. s. mont.*
- var. *lapponica*, *Stgr.*, S. E. Z., 1861, 347 (formæ geographicæ plus minusve constantes. cum trans. ad *pales* et ad *arsilache*). *Scand. bor.; Amur inf.*
- var. ? bona sp. *arsilache*, *Esp.*, 56, 5, ii., p. 35; cf. *Stgr.*, S. E. Z., 1861, p. 347; *Meyer-Dur*, *Schmett. Schw.*, p. 114 (al. ant. subtt. nigro maculatis). *Germ. pal.; Helv. val.; Scand.; Ross. bor. et cent. Sib. ad 70° N.*

\* Scudder's 'Butterflies of New England,' Boston, 1889.

- CHARICLEA, *Schn.*, N. Mag., v., p. 588 (1794); Hb., 769—70; Stgr., S. E. Z., 1861, p. 348.  
 var. *boisduvalii*, Dup., i., p. 127, t. 20, 4; Edw., Cat., No. 147 (subtus minus albo variegata, inconstans, nomen vix conservandum).  
 var. *obscurata*, M'Lach., J. Linn. Soc., 1878, Zool., 14, p. 110.  
*A. butleri*, Edw., Can. Ent., xv., p. 32 (obscurior, forma arctica nomen vix conservandum).
- MONTINUS, *Scudd.*, Proc. Essex Inst., 3, 166 (1862).  
*A. chariclea* var. *montinus*, Streck., Cat., p. 116.  
*Brenthis montinus*, Scudd., Butt. New Eng., 601, t. 5, 11.
- HELENA, *Edw.*, Trans. Am. Ent. Soc., iii., 268 (1871); Mead, Rep. Wheeler Exp., v., 757 (1875).
- SELENIS, *Ev.*, Bull. Mosc., 1837, 1, 10; H.-S., 154—5; Gracs., Berl. Ent. Zeit., 1888, p. 89.  
 ? var. *sibirica*, Ersch., Bull. Mosc., 1870, i., p. 112 (supra obscurior, subt. multo vivacior).
- ANGARENSIS, *Ersch.*, Bull. Mosc., 1870, i., p. 112; Graes., Berl. Ent. Zeit., 1888, p. 94.
- FREIJA, *Thunb.*, Diss. Ent., 2, p. 34, t. fig. 14 (1791); Hb., 55—6; Edw., Cat., No. 148.  
 ? var. *tarquinius* (*Melitæa tarquinius*), Curt., App. Ross., 2nd Voy., p. 68 (1835), (? var. *minor arctica*).
- POLARIS, *Bdv.*, Ind., p. 15 (1829); Ic., 20, 1, 2; Schoyen, Norg. Arkt. Lep. (Arch. Math. og. Naturv., v., p. 156); Edw., Cat., No. 149.
- AMATHUSIA, *Esp.*, 88, 1, 2 (1783), ii., p. 170.
- Eur. Asia et Am. bor.; Labr.; Newfoundland; Rocky Mts.; Brit. Columbia.*  
*Grinnell Land, 80° N.*  
*Kotzebuc Sound (N.W. Am. 67—68° N.; Nova Zembla (fide Butler).*  
*White Mts., New Hampshire, U.S.A.*  
*Rocky Mts., 7000—13,000 ped. alt.; New Mexico to Montana.*  
*Uralcentr. et mer.; Altai.*  
*Amur sup. et inf.; Irkutsk; Sib. bor. ad 65° N. (Trybom).*  
*Irkutsk; Amur sup. et inf.*  
*Eur. Asia, 59° ad 70° N.; Rocky Mts., Colorado; Montana; Am. bor. ad circa 63° N.*  
*Boothia felix, 70° N.*  
*Labr.; Arct. Am. ad 81° 52' N. (fide Edw.); Norv. bor. 71° N.*  
*Germ. s. or. et mer.; Alp.; Ross. cent. et s. (excl. reg. pol.) Altai; Amur inf. (Graeser).*

- DIA, *Linn.*, S. N., xii., 785 (1766); *Hb.*, 31—3. *Eur. or. cent et m.*;  
*Gall.*; *It. cent. et s.*; *Bith.*; *Pont.*;  
*Arm.*; *Allai*; *Sib. centr.*
- FRIGGA, *Thunb.*, *Diss. Ent.*, 2, p. 33 (1791); *Eur. Asia* 60° ad  
*Hb.*, 49, 50; *Edw.*, *Cat.*, No. 150; 70° N.  
*Schilde*, S. E. S., 1873, p. 177.\*  
var. *saga*, *Kaden MSS.*, *Stgr.*, S. E. Z., *Rocky Mts., Col.*;  
1861, p. 350; *Streck.*, *Cat.*, p. 117 (subt. *Labrador*; *Am.*  
obscurior, trans. ad *improba*, nomen vix *bor. ad circa* 63°  
conservandum). *N.*  
var. *improba*, *Butl.*, *Ent. Mo. Mag.*, 1877, *Am. arct.* 67°—68°  
206 (var. *arctica*, minor; supra et subt. *N. (Richardson)*;  
multo obscurior). *Nova Zembla*  
*(Markham)*.
- BELLONA, *Fabr.*, *Syst. Ent.*, p. 517 (1775); *U.S. Am. bor. or.*  
*Scudd.*, *Butt. New Eng.*, p. 608, t. 5, 13, *et Am. Brit.*  
15.  
var. *epithore*, *Bdv. MSS.*, *Edw.*, *Pr. Ent.* *California, Oregon*;  
*Soc. Phil.*, ii., p. 504 (1864), (al. ant. apice *Wash. Terr.*;  
minus prolongatis, marg. ext. rotundatis, *Col. (fide Mead)*;  
basi minus suffusis; subtus pallidior). *Alaska.*  
var. ? *kreinhild*, *Streck.*, *Ruffin. Rep.*, 1878, *Arizona*; *Utah.*  
p. 1854, t. 1, 5, 6, ♀ (pallidior, forma  
"terræ siccae"; non vidi).
- THORE, *Hb.*, 571—3. *Alp. Germ. Helv.*  
*et Ped.*; *Asiabor.*  
ad 70° N. (*Try- Scand.*  
*bom*); *centr.*  
var. *borealis*, *Stgr.*, *Cat.*, 9; S. E. Z., 1861, *Lap.*; *Altai*; *Amur*  
351 (dilutior; formæ intermediæ adsunt). *sup. et inf.*
- AMPHILOCHUS, *Men.*, *Schrenk's Reise*, p. 21, *Amur sup. (Poch-*  
t. ii., 1; *Graes.*, *Berl. Ent. Zeit.*, 1888, p. *rofka)*.
- ASTARTE, *Doubl. Hew.*, *Gen. Di. Lep.* t. 23, 5 *Mtns. of British*  
(1848). *Columbia?*
- INO, *Esp.* 76, 1, a, b (1782), ii., p. 125. *Eur. (excl. Angl.*  
*Bat. Ib. Græc. et*  
*? It. m.) Bith.*;  
*Pont.*; *Altai.*  
var. *amurensis*, *Stgr.*, *Rom. Mem.*, iii., *Amur sup. et mer.*  
p. 146; *Graes.*, *Berl. Ent. Zeit.*, 1888, p. *(cum typus)*; *Ja-*  
96 (pallidior, subt. al. post. violascens). *pan*, 5000 *ped. all.*
- DAPHNE, *Schiff.*, S. V., p. 177; *Hb.*, 45, 46. *Germ. (excl. s. occ.)*;  
*Gall.*; *Hisp. c.*  
*Helv. mer. occ. It.*;  
*Eur. or. m.*; *A.*  
*Minor*; *Allai.*

- var. *rabdia*, *A. rabdia*, Butl., Ann. Nat. Hist., 1877, p. 93; Fixsen, Rom. Mem., iii., p. 304. *Amur; Korea; Japan.*
- var. *fumida*, Butl., Ann. Nat. Hist. (5), ix., p. 16 (1881), (paullo major; al. ant. magis excavatis; subt. al. post. magis cinerascens; formæ intermed. adsunt).
- MECATE, *Esp.*, 76, 3, a, b (1782), ii., p. 127. *Eur. or. mer. (excl. Græc.); Gall. m.; It. s.; Hisp. cent. et m.; A. Minor; Cauc.; Altai.*
- var. *alaica*, Stgr., S. E. Z., 1886, p. 236 ("pallidior, punct. nigris minoribus," *fide* Stgr., non vidi). *Alai Mts.; Alatau.*
- EUGENIA, *Ev.*, Bull. Mosc., 1847, ii., 68; Lep. Ross., t. 11, 1, 2; Trybom, Ofver. Vetensk. Acad. Forh., 1887, p. 45. *Sib. or. bor. (prov. Irkutsk); Dudinská, 69° N. (Trybom).*
- LATHONIA, *Linn.*, S. N., x., 481; Hb., 59, 60. *Eur. (excl. reg. pol.); Canar.; Maur.; Asia occ. et centr.*
- var. *isæea*, Gray, Lep. Nep., p. 11 (1846), sine descr. *Himalaya, mont. et alp.*
- lathonia*, Koll., Hügel's Kash., iv., p. 440; Elwes, P. Z. S., 1882, p. 404; de Nicé., Butt. Ind., ii., p. 137.
- issæea*, Moore, Cat. E. I. C., p. 156 (sine descr.)  
(subt. al. post. mac. arg. discali lanceolata non ovali; et angl. abdom. arg. fasciato non maculato).
- \*CYTHERIS, *Drury*, Ill. Ex. Ent. ii., t. 4, 3, 4 (1773). *Chili sept. med. et mer.*
- Brenthis cytheris*, Butl., Trans. Ent. Soc. Lond., 1877, p. 465.
- A. siga*, Hb., Zutr., t. 677, 678 (1832).
- A. montana*, Reed, Mon. Mar. Chilenas, t. 1, 6 (1877).
- \*LATHONIOIDES, *Blanch.*, in Gay's Fauna Chilena, vii., p. 22, t. 2, 12 (1852). *Chili sept. med. et bor. ad 6000 ped. (fide Reed).*
- ? *anna*, *Blanch.*, l. c., p. 23. *Rep. Argent.*
- ? *A. dexamene*, *Boisd.*, Bull. Soc. Ent. Fr., 1859, p. 157.
- B. lathonioides*, Butl., Trans. Ent. Soc. Lond., 1877, p. 466.
- A. anna*, *Reed*, Mon. Mar. Chilenas, p. 29.

\* Cf. Berg. Ann. Soc. Arg. xiii., pp. 164—5 (1882), qui *dexamene* nom. specif. pro *lathonioides* preferet.



- MODESTA, *Blanch., l. c.*, vii., p. 24, t. 2, 3, 4. *Chilimont.* 8000—  
*Brenthis modesta*, *Butl., l. c.*, p. 466. 10,000 *ped.* (*vide*  
*A. modesta*, *Reed, l. c.*, p. 32. *Edmonds*).
- HANNINGTONI, *sp. nova.* *Taveta prope mon-*  
*tem Kilimanjaro;*  
*Africa centr.*
- ELISA, *God., Enc. Meth.*, p. 817 (ed. 1823 ?); *Corsica; Sard.*  
*Dup., i.*, 18, 3, 4, p. 114. (*terris calc. re-*  
*cyrene*, *Bon., Descr.*, p. 175 t. i. i. (1824); *stricta*).  
*H. G.*, 822, 5.
- ALEXANDRA, *Men., Cat. Reis.* p. 246 (1852); *Arm. m. or. Hyrc-*  
*H.-S.*, 417—18. *cania.*
- AGLAIJA, *Linn., S. N.*, x., 481; *Hb.*, 65, 66. *Territ. (excl. Maur.*  
*fortuna*, *Jans., Cist. Ent.*, ii., p. 154 (1877). *Canar, Syr. Hyrc.*  
*et Pers.); Japan;*  
*E. Tibet.*
- var. ? *vithatha*, *Moore, P. Z. S.*, 1874, p. *Skorolah, Ladak,*  
 568; *de Nicé., Butt. Ind.*, ii., p. 136 15,000 *ped. alt.*  
 (minor; dilutior; pallidior; forma al- (*Leech*); *Gilgit*  
 pina). (*Biddulph*).
- NIobe, *Linn., S. N.*, x., 481, xii., 786; *Hb.*, *Eur.; Asia occ. et*  
 65, 66. *centr.*  
 ab. *eris*, *Meig., i.*, p. 64, t. 14, 5, 6; *niobe*,  
*Hb.*, 61, 62 (subt. punctis argenteis  
 paucis vel nullis; forma frequentior).
- var. *orientalis*, *Alph., Lep. Kuldja*, p. 77 *Asia centr. (Kuld-*  
 (pallidior; minus nigro punctata, ? con- ja).  
 stans).
- var. *gigantea*, *Stgr., Cat.*, 1870, p. 21; *Hyrcania.*  
*niobe*, *Led., Hor.*, 1869, 82 (var. maxima,  
 ♂ satur. fulvus, ♀ virescens).
- JAINADEVA, *Moore, Ent. Mo. Mag.*, i., p. 131 *N. W. Himalaya;*  
 (1864); *P. Z. S.*, 1865, t. xxx., 1; *de Nicé.,* *Ladak, 7—12,000*  
*Butt. Ind.*, ii., 135. *ped. alt.*
- NERIPPE, *Feld., Wien. Ent. Mon.*, vi., p. 24 *Japan; Korea;*  
 (1862); *Leech, P. Z. S.*, 1887, p. 423. *China c. (Pratt).*  
*A. coreana*, *Butl., Ann. Nat. Hist.*, 1882,  
 ser. v., ix., p. 15.  
*A. adippe* var. *nerippe*, *Elwes, P. Z. S.*,  
 1881, p. 901.
- ADIPPE, *Linn., S. N.*, xii., 786 (1766); *Esp.*, *Eur. (excl. reg.*  
 18, 1, etc. *pol.); Asia occ. et*  
*A. pallescens*, *Butl., Cist. Ent.*, i., p. 164. *or. Japan; Korea;*  
*A. vorax*, *Butl., Trans. Ent. Soc. Lond.* *China centr.*  
 1871, p. 403; *Lep. Ex.*, t. 54.  
*A. locuples*, *Butl., Ann. Mag. Nat. Hist.*,  
 ser. v., vol. 7, p. 134; *cf. Leech, P. Z. S.*,  
 1887, p. 423; *Graeser, Berl. Ent. Zeit.*,  
 1888, p. 94.  
 ab. *elcodoxa*, *Ochs., iv.* p. 118; *adippe*, *Esp.*,  
 26, 4.

- ab. *cleodippe*, Stgr., Cat., 1870, p. 21.  
 var. *chlorodippe*, H.-S., vi., p. 5; *adippe*,  
 Ramb., Faun. And., p. 279.  
 var. *taurica*, Stgr. MSS.  
 ab. *xanthodippe*, Fixsen, Rom. Mem., iii.,  
 p. 307 (varietates inconstantes, cum mul-  
 tis formis intermediis, nomina vix con-  
 servanda).
- LAODICE, *Pall.*, Reise, i., 470 (1771); *Esp.*,  
 93, 1; *Künow*, Schr. Ges. Königsb., 1872,  
 p. 447, t. vii.\*  
 var. *japonica*, *Men.*, Cat., p. 102, t. x., 3  
 (1857), (inconstans, nom. haud conser-  
 vandum). *Germ. s. or.*; *Ross.*;  
*Taurus*; *Arm.*;  
*Lenkoran*; *Amur*;  
*Japan*; *China sept.*  
*et centr.*; *Tibet or.*
- RUDRA, *Moore*, Cat. E. I. C., i., p. 157 (1857);  
 de *Nicé.*, *Butt. Ind.*, ii., p. 132, t. xviii.,  
 fig. 75, ♂. *Montes Khasia (Ind.*  
*or.)*, 4—5000 *ped.*  
*alt.*; *Burmah sup.*  
*(montibus)*.
- LYSIPPE, *Janson*, Cist. Ent., ii., 1877, p. 154.  
 ♀ *ruslana*, *Motsch.*, Bull. Mosc., 1866, ii.,  
 p. 117. *Amur*; *Askold*;  
*Japan.*  
*A. ruslana*, *Elwes*, P. Z. S., 1881, p. 902;  
*Leech*, P. Z. S., 1887, p. 424; *Pryer*, Cat.  
 Lep. Japan (in *Trans. As. Soc. Jap.*),  
 1883, p. 235.
- ANADYOMENE, *Feld.*, Wien. Ent. Mon., vi., p.  
 25 (1862). *Amur*; *Askold*;  
*Japan*; *China*  
*centr.*; *Ningpo.*  
*A. ella*, *Brem.*, Lep. Ost. Sib., p. 94, t. 8,  
 1 (1864).
- PAPHIA, *Linn.*, S. N., x., 481; *Esp.*, 17, 1, 2;  
*Büchl.*, Ent. Mo. Mag., xiv., p. 252—6  
 (1877).\* *Eur. (excl. reg.*  
*bor.)*; *Asia occ.*  
*et or.*; *Japan*;  
*China sept. et cent.*  
*A. paphioides*, *Butl.*, Ann. Nat. Hist.,  
 ser. v., vol. 7, p. 134.  
 ab. ? et var. ♀ *valesina*, *Esp.*, 107, 1, 2  
 (supra virescens, formæ intermediæ ad-  
 sunt, et in Asia or. typicæ sunt).
- PANDORA, *Schiff.*, S. V., p. 176 (1776); *Esp.*,  
 58, 1, 2. *Eur. m.*; *Maur.*;  
*Canar*; *Asia occ.*  
*et centr.*; *Gilgit.*  
*maja*, *Cram.*, i., xxv., B, C (1776 ?).
- KAMALA, *Moore*, Cat. E. I. C., p. 156 (1857);  
 de *Nicé.*, *Butt. Ind.*, ii., p. 134. *Him. bor. occ.* 6000  
 —10,000 *ped. alt.*  
*A. cnidia*, *Feld.*, Reise Nov., iii., p. 392,  
 t. 50, 5, 6, ♀ (1867).
- CHILDRENI, *Gray*, Zool. Misc., i., p. 33 (1831);  
*Ins. Nepal*, t. xi., ♂ (1846). *Him.* 6—10,000  
*ped. alt.*; *Montes*  
*Khasia et Bur-*  
*mah sup.*; *China*  
*centr.*  
*A. sakontala*, *Koll.*, Hügel's Kash., iv.,  
 p. 439, t. xii., ♂ ♀ (1848).

- SAGANA, *Dblid. Hew.*, Gen., t. 24, i. ♂ (1849);  
*Damora paulina*, Nordm., Bull. Mosc.,  
 1851, ii., p. 440, t. 12, 1, 2, ♀. *Sib. or. Amur;*  
*Korea; Japan;*  
*China sept. et cent.*
- NIPHE, *Linn.*, S. N., 1, 2, p. 785 (1767); *Regio Ind.; China*  
*Cram.*, t. 14, B. E. *mer.; Japan.*  
*Acidalia niphe*, Moore, Lep. Ceyl., i. p.  
 60, t. 31, 2, a, b\*.  
 var. *inconstans*, Butl., Cist. Ent., i., p. 164 *Java; Australia*  
 (1873), (minor, pallidior, ♀ al. ant. albis *sept. (Moreton*  
 non fasciatis). *Bay, etc.)*
- IDALIA, *Drury*, i., t. 13 (1775); *Cram.*, t. 44, *U.S. Am.; Maine*  
 D, G (1779); *Edw.*, Can. Ent., 1879, p. *ad Nebr. et Arks.*  
 217\*.  
*Speyeria idalia*, Scudd., Butt. New Eng.,  
 p. 535, t. 4, 3, 8, t. 12, 12 (1889).
- DIANA, *Cram.*, ii., t. 98, D, E (1775), ♂; *Feld.*, *U.S. Am.; Alle-*  
*Reise Nov.*, t. 50, 3, 4, ♀ (1867); *Edw.*, *ghany Mts.; Ohio;*  
*Butt. N. A.*, i., 63, t. 20, 1868., *Arg.*, t. 7, *Ill.; Arks.*  
 a—h\*; *id.*, Can. Ent., 6, 121, 1874\*.
- CYBELE, *Fabr.*, Syst. Ent., 516 (1775); *Edw.*, *U.S. Am. or. et*  
*Butt. N. A.*, i., 67, t. 21 (1868); *id.*, *centr.; Can. N.W.*  
*Can. Ent.*, 6, 121 (1874)\*. *Terr.*  
 ? *carpenterii*, *Edw.*, Tr. A. E. Soc., v., p. *New Mexico.*  
 204 (1876), (mihi nat. ignota).  
*A. cybele* var. *carpenterii*, *Edw.*, *Butt. N.*  
*A.*, iii., pt. 8 (1889)\*.
- LETO, *Behr.*, Pr. Cal. Acad., 2, 173 (1862); *U.S. Am.; Cal. ad*  
*Edw.*, *Butt. N. A.*, i., 85, t. 29 (1869). *Wash. Terr.; Fort*  
*cybele*, *Bdv.*, Lep. Cal., 60 (1869). *Macleod, N.W.T.*  
*cybele* var., *Streck.*, Cat., p. 111 (rectius *(fide Geddes);*  
*bona species).* ? *Col.*  
*A. nokomis* ab., *Streck.*, Ruffn. Rep., p.  
 1864 (1878), ♀? (♀ al. sup. et inf. ad  
 basin obscurioribus; supr. marg. lute-  
 scente; non cinnamomeo).
- NOKOMIS, *Edw.*, Pr. Ac. Phil., 1862, 221; *U.S. Am.; Ariz.;*  
*Butt. N. A.*, i., 73, t. 23 (1868); *Mead,* *Utah.*  
*Wheel. Rep.*, p. 757, t. xxxv., 1—4  
 (1875), ♂ ♀.  
 var. *nitocris*, *Edw.*, Tr. A. E. Soc. v., 15 *Ariz.; Nevada;*  
 (1874); *Can. Ent.*, 1879, p. 82; *Mead,* *Col.*  
*Wheel. Rep.*, p. 751, ♂; *Edw.*, *Butt. N.*  
*A.*, iii., Arg. 1 (subt. al. post. ad basin  
 cinnamomeis; trans. ad *leto*).
- APHRODITE, *Fabr.*, Mant., 2, 62 (1767); *Edw.*, *U.S. Am. (excl.*  
*Butt. N. A.*, i., 71, t. 22 (1868); *id.*, *Can.* *mer. et. occ. Cana-*  
*Ent.*, 6, 121 (1874)\*. *da; N.W. Terr.;*  
 ? var. *haleyone*, *Edw.*, *Butt. N. A.*, i., 83, *Col.; Wyoming.*  
 t. 28 (1869), ♂ (al. ant. magis elongatis?).  
 ? var. *alcestis*, *Edw.*, Tr. A. E. Soc., v., *Mich.; Ill.; Nebr.;*  
 289 (1876); *Can. Ent.*, 12, 69 (1880)\*. *Mont.; Col.*

- cypriis*, Edw., Can. Ent., 1886, p. 62 (var. vel forma inconstans occidentalis; et trans. ad *aphrodite*; paullo major, rubidior, vix distinguenda).
- var. vel ? bona sp. *nausicaa*, Edw., Tr. A. E. Soc., v., 104 (1874); id., *Papilio*, 3, 6 (1883); id., Butt. N. A., iii., Arg., x.
- ? *aphrodite*, Mead, Wheel. Rep., p. 752 (forma *Arizonensis* rubidior; al. post. subt. mac. arg. minoribus; ♂ al. post. ciliis subcostalibus minus elongatis).
- LAIS, Edw., Can. Ent., 15, 209, 1883; Geddes, Can. Ent., 19, p. 230 (*atlantis* var. ? minor, pallidior). *N.W. Terr.; Fort Edmonton (Geddes).*
- ATLANTIS, Edw., Pr. Ac. Phil., 1862, 54; Butt. N. A., i., 75, t. 24 (1868); Can. Ent., 9, 35 (1877)\*; Scudd., Butt. N. E., p. 571, t. 4, 6, etc. *U.S. Am. bor.; Lab. Newf.; Canada, N.W. Terr. ad. circa 60° N. Col.; New Mexico; Montana.*
- var. *electa*, Edw., Field and Forest, 3, 143 (1878). *Col.; Utah; Montana.*
- atlantis*, Mead, Wheel. Rep., p. 754 (al. post. subt. mac. arg. paucis; ? trans. ad *hesperis*).
- hesperis*, Edw., Pr. E. S. Phil., 2, 502 (1864); id., Butt. N. A., i., 79, t. 26 (1874); Mead, Wheel. Rep., 754 (1875) *Brit. Columb. sept. (Crotch).*
- ? var. vel transitus ad *zerene*.
- ? *columbia*, H. Edw., Pr. Cal. Acad., 6 (1877). *Californ. to Wash. Terr.; N.W. Terr. (Geddes). Nev.; Mont.; Utah.*
- CORONIS, Behr., Pr. Cal. Acad., 2, 173, 1862, No. 2; Edw., Pr. E. Soc. Phil., iii., 435 (1864); Butt. N. A., iii., Arg., iv. *Nevada.*
- ♀, *nevadensis*, Edw., Butt. N. A., i., t. 33 (1871). *Nevad.: Cal.; Utah. San Bernardino Co., Cal.*
- juba*, Bdl., Lep. Cal., p. 60 (1869). *Napa Co., Cal.; Utah.*
- ? *macaria*, Edw., Field and Forest, 3, 86 (1877). *Nevada.*
- ? *ehitone*, Edw., Can. Ent., 11, 82 (1879). *Nevad.: Cal.; Utah.*
- var. *semiramis*, Edw., Can. Ent., 18, 61 (1886), (forma meridionalis et deserticola; supra dilutior, minus nigro notata).
- var. vel trans. ad *calippe*; *liliana*, H. Edw., Pr. Cal. Acad., 6, 1876; Edw., Butt. N. A., iii., Arg., t. iii. *San Bernardino Co., Cal.*
- laura*, Edw., Can. Ent., 11, 49 (1879). *Nevada.*
- CALLIPPE, Edw., Ann. Ent. Soc. Fr., 2, x., 302 (1852); Edw., Butt. N. A., i., 77, t. 25 (1868). *California.*
- ? var. vel trans. ad *edwardsii*, vel ad *zerene*, *inornata*, Edw., Trans. Am. Ent. Soc., iv., p. 64 (1872); Butt. N. A., ii., Arg., t. v. (1876). *Cal.; Nevada.*

- EDWARDSII, *Reak*, Pr. E. Soc. Phil., vi., 137 (1866); Edw., Butt. N. A., i., 87, t. 30 (1869); cf. Mead, Wheel. Rep., p. 754.  
 var. vel bona sp. *nevadensis*, Edw., ♂, Tr. A. E. Soc., iii., 14 (1870); Butt. N. A., i., 93, t. 33 (1871), ♂ non ♀ (? forma minor; ♀ supra pallidior, subt. virescens, ? transitus ad *meadii*).  
 var. vel bona sp. *meadii*, Edw., Tr. A. Ent. Soc., v., 69 (1872); Butt. N. A., ii., Arg., t. ii. (1875).  
*nevadensis* var. *meadii*, Edw., Cat., 1884, p. 28. Cal.; Mont.; Utah. Nev.; Mont.; Utah.
- MONTICOLA, *Behr.*, Pr. Cal. Acad., ii., p. 175, No. 8 (1862); Edw., Butt. N. A., i., 81, t. 27 (1868). California; Oregon; Wash. Terr.; Brit. Col.; N.W. Terr. (Geddes); Nevada; Montana (fide Edw.).  
 ? var. *purpurascens*, H. Edw., Pr. Cal. Acad., 6 (1876), (minor supra obscurior, nom. vix conservandum).  
 ? var. *behrensi*, Edw., Tr. A. E. Soc., ii., 370 (1869); Butt. N. A., i., 89, t. 31 (1870), (? trans. ad *monticola* vel ad *bremneri*, nomen vix conservandum). Mendocino Co. Cal.
- BREMNERI, *Edw.*, Tr. A. E. Soc., iv., 63 (1872); Butt. N. A., ii., Arg., t. 4 (1874). Wash. Terr.; Brit. Col.; Vancouver's Isl.; ? Cal. Oregon; Cal. sept.
- hippolyta*, Edw., Can. Ent., 11, 81 (1879).  
 ? var. *rhodope*, Edw., Tr. A. E. Soc., v., 13 (1874); Butt. N. A., ii., Arg., t. 6 (1874), (minor, ? inconstans; nom. vix conservandum).
- ZERENE, *Bdl.*, Ann. Soc. Ent. Fr., 1852, p. 302 (in parte); *Behr.*, Pr. Cal. Acad., ii., 175, No. 9 (1862). California; Shasta, Plumas Co., etc.; Nev.; Utah (fide Edw.).  
 ? *hydaspe*, *Bdl.*, Lep. Cal., 60, 1869; Edw., Butt. N. A., i., 91, t. 32 (1870), as *zerene*.  
 ? *irene*, *Bdv.*, Lep. Cal., p. 59 (1869); Edw., Can. Ent., 1879, p. 53.  
*zerene* var. *irene*, *Sireck.*, Cat., p. 113.  
 ? *rupestris*, *Behr.*, Pr. Cal. Acad., ii., 175 (1862), No. 6; Edw., Butt. N. A., ii., Arg., 7 (1876).  
*egleis* var. *irene*, *Bdv.*, Lep. Cal., 59 (1869), fide Edw.  
 (formæ inconstantes minores quam *monticola*; nomina incerte identificanda; vix conservanda).  
 var. ? *adiante*, *Bdl.*, Lep. Cal., 61 (1869); *Behr.*, Pr. Cal. Acad., ii., 175 (1862), No. 7. Sta. Clara Mts.; California.  
*adiaste*, Edw., Pr. E. Soc. Phil., iii., 436 (1864), (*zerene* proxima; supra et subt. dilutior, al. post. subt. inconspicue notatis).

- EURYNOME, *Edw.*, Tr. A. E. Soc., iv., 66 *Col.; Mont.; N.W.*  
 (1872); Butt. N. A., ii., Arg., t. i. (1875)\*; *Terr.; ? Brit. Col.*  
 Mead, Rep. Wheel. Exp., v., 755 (1875).  
*astarte*, *Edw.* (nec. Doubl.), Pr. E. Soc.  
 Phil., i., 221 (1862).  
*clio*, *Edw.*, l. c., 106; Geddes, Can. Ent., *N.W. Terr.; Brit.*  
 19, 232. *Col.*  
*artonis*, *Edw.*, l. c., 9, 2 (1881), (minor *Col.; Nev.*  
 subt. mac. arg. nullis vel paucis).  
 ? *bischoffii*, *Edw.*, Tr. A. E. Soc., 3, 189 *Sitka; Alaska.*  
 (1870); Butt. N. A., ii., Arg., t. iii. (1875),  
 (var. vel? bona sp.; obscurior, subt. mac.  
 albidis).  
*var. opis*, *Edw.*, l. c., 5, 105 (1874); Butt., *Brit. Col.*  
 ii., Arg., t. iii. (1875).  
*var. vel transitus ad montivaga.* *Wash. Terr.; Col.;*  
*arge*, Streck., Cat., 114 (1878). *Cal.*  
*erinna*, *Edw.*, Can. Ent., xv., 33 (1883); *N.W. Terr.; Brit.*  
 Geddes, Can. Ent. xix., 232 (1887). *Col.*  
*var. ? vel bona sp. montivaga*, Behr., Proc. *Sierra Nevada;*  
 Cal. Ac., 2, 174, "No. 4" (1862), id., l. c., *Cal.; Nev.*  
 3, 84 (1863); *Edw.*, Can. Ent., xi., p. 52  
 (1879).  
*A. zereue* var. *montivago*, Streck., Cat., p.  
 114 (al. ant. paullo magis elongatis; subt.  
 minus viride tinctis).  
 ? var. *egleis*, Bdv., Lep. Cal., 59 (1869), *Sierra Nevada;*  
*vide* *Edw.*; *Edw.*, Butt. N. A., iii., Arg., *Cal.; Utah; Col.;*  
 t. ix.\* *Nevada.*  
*montivaga*, *Edw.* (non Behr.), Proc. E. Soc.  
 Phil., iii., 435 (1864).  
 ♀ *mormonia*, Bdv., Lep. Cal., 58 (1869),  
 (subt. mac. arg. subnullis; nomen vix  
 conservandum).

*A. aphirape*, like almost all wide-ranging species, varies very much, but the varieties are inconstant. The Labrador form, which Staudinger, as I think wrongly, refers to *tricularis*, though paler above, and in the female sex, than typical Lapland specimens, is more like them than those from Nikolaievsk and Colorado, which are paler, and nearer to the German and Armenian form. One from Hudson Bay is like those from Esthonia and St. Petersburg, intermediate between the type and *ossi-anus* in size and colour, but marked beneath like *ossi-anus*. The American form seems rare and confined to great elevations in the Rocky Mountains, but will probably be found at many points in Arctic America.

*A. hegemon* is considered by Staudinger and Alpheraky as nearest to *euphrosyne*, of which the former says it

may be a form, but the markings of the under side seem to me to show its nearer affinity with *aphirape*. Alpheraky says that Kuldja specimens differ constantly from those from Margilan, but the difference in my specimens is very slight.

*A. selene* seems to vary less than most of the species, but its aberrations are numerous, and some are named and figured by Spangberg. The arctic var. *hela* in typical specimens may be separated, but I think is hardly deserving of a name.

*A. oscarus*, as figured by Eversmann, is a sufficiently distinct species, though my specimens are not so bright in colour as his. He compares it with *ossianus*, as Fixsen does with *euphrosyne*, but it seems to me nearer to *selene* than to either, though it may be distinguished from both by the larger size, and by the absence of any silvery spots on the middle band of the hind wing below. I have not seen enough of the variety *australis* to say whether the difference is marked and constant, but Graeser says it has the same relation to the type as *aphirape* and *euphrosyne* have to *ossianus* and *finjal*, and that the difference is much greater.

*A. perryi*, Butl., from Possiet Bay, of which I have seen the typical specimens, appears to be the same as *iphigeneia*, but the identification is not certain.

*A. iphigeneia* is a species of which I know but little. I have a single not very fresh specimen from Amurland which agrees with Graeser's specimens and description exactly, and three others from Gensan in Korea, collected by Mr. Leech, which agree with it in the shape of the wings, but on the under side show more of the markings of *selene*. Graeser says it is near *oscarus* and *euphrosyne*, but differs from both in the longer narrower wings, and in the colour and pattern of the under side of the hind wing. I cannot consider it as a variety of either of these species, and, without seeing a long series of both sexes, am not able to say that it is distinct, though before Graeser had described it, I had separated my specimen as one which I could not identify with certainty.

*A. euphrosyne*, var. *finjal*, is a boreal form which in Lapland, Jemtland, Finland, and other parts of Northern Europe, and perhaps Asia, appears pretty constant; but the form found at Bodo in Arctic Norway is *euphrosyne*,

and occasional examples of *finjal* occur in the Alps (I have one from Tarasp).

*A. myrina*, though a very near ally of *selene*, next to which, perhaps, it should be placed, is sufficiently distinct and constant to be recognised. It seems to have a very wide range in the colder but not in the arctic parts of North America, but is somewhat local.

*A. altissima*, *gemmata*, and *clara* are three allied, but very distinct and beautiful species, which seem best placed here; they are all confined to the alpine regions of the Himalaya. The exact habitat of *A. clara* was long doubtful, but it has lately been found by Mr. Duthie and others at Gangootri, near the source of the Ganges, and at Phuladaru, in the province of Gurwhal. *A. gemmata* occurs somewhere in the same country, as well as in alpine Sikkim, where it seems very abundant.

*A. jerdoni* and *A. gong* are also allied species, though easily distinguished from each other by the markings of their under side. One inhabits the western, the other the extreme eastern edge of the great Asiatic highlands, and both as yet are known from one locality only, though their range is probably not so restricted as it seems.

*A. pales*.—The varieties of this species are so endless that it seems almost impossible to retain names for any of them except the form known as *arsilache*, which occurs in the peat-bogs of Northern Germany, and in Northern Europe and Asia; and which by some good entomologists, among whom Zeller and Meyer-Dur are prominent, is considered as a distinct species. After studying very carefully and repeatedly my own collection, containing 74 males and 56 females, in which all the known forms except the Greek one are very fully represented, and seeing thousands of specimens in other collections, I do not see how any of the named forms can be defined with certainty, and though typical specimens from the Caucasus and Central Asia could be recognised as local variations, they are nowhere constant to one type. The most distinct are those from some parts of Central Asia (var. *generator*, Stgr.), especially from South-western Altai, and the Skorolah in Western Ladak, some of which have the spots on the upper surface almost obsolete, and the under side very peculiar. Those from the Caucasus (var. *caucasica*, Stgr.) are very bright in colour above, and much spotted below,



closely resembling the average Pyrenean specimens, and below intermediate between *pales* and *arsilache*. Those from Greece (var. *græca*, Stgr.) are described as paler below and with the fringes variegated, but this is also the case in some alpine and Himalayan specimens. The majority of these last, however, which have been named *sipora* and *baralacha* by Moore, are much nearer to Swiss than they are to Central Asiatic ones, and certainly cannot be separated.

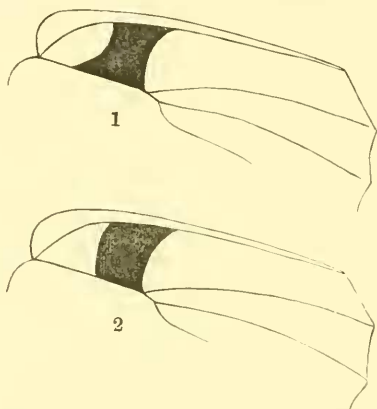
Staudinger considers *arsilache* as a var. only of *pales*, saying that the Scandinavian form, which he names *lapponica*, is intermediate; but Zeller says that his evidence, cf. Stett. Ent. Zeit., 1861, p. 347, and 1872, p. 44, tells as much in favour of their distinction as of their identity. Meyer-Dur also, in his excellent work on the Swiss butterflies, strongly supports the idea that they are different, but Frey, who had probably a larger material and experience, agrees with Staudinger. *A. pales*, however, is everywhere the typical mountain form, and *arsilache* the lowland one: out of fourteen pairs from Denmark, Sweden, Norway, and North Russia, all but four are nearer to *arsilache*, those from the Dovrefield being the only exceptions.

Considering, therefore, that in Europe we can usually distinguish the two forms by their markings, and the difference in their habitat, and that their larvæ have probably different food-plants, it will only be a question of individual opinion whether they are distinct species. It is curious that *pales*, which is found over such a wide area, and is common wherever it occurs, should be absent, and have no near ally in N. America.

*A. chariclea* is a circumpolar species, but hitherto found only in isolated localities in Lapland and Siberia, whilst in Labrador, British America, and Greenland it is more generally distributed. It varies considerably, and in the extreme north is much darker in colour above (var. *obscurata*, M'Lachl.); whilst in the Rocky Mountains, and occasionally in Labrador, it assumes the form *boisduvalii*, which Edwards treats as distinct. I cannot, however, see any good reason for this, as there is no possible line of division between the two; and Geddes found both flying together at a high altitude in the Rocky Mountains. It extends to a higher latitude than any other butterfly, except *A. polaris*.

*A. montinus* is certainly a form of *chariclea*, which has remained isolated on the White Mountains for so long that it has assumed a distinctive character, and may be considered as a good instance of a fixed local race. The Rocky Mountain form of *chariclea*, which exists under very similar conditions, seems the nearest to it, but I have seen none which could possibly be mistaken for *montinus*.

*A. helena* is probably another representative which extends far south on the higher parts of the Rocky Mountains. In Montana I took it at 6500 ft. In Colorado it ascends to 13,500 ft. It is not unlike *selenis*, but may be distinguished by the lighter shade of coloration, and less heavy spotting above, and by the shape of the large patch nearest the costa on the band of the hind wing below, which in eleven specimens had the



1. *A. helena* : costa of hind wing below. 2. *A. selenis* : costal patch of hind wing below.\*

shape shown in the annexed cut, whilst one only was straight on the inside, as was the case more or less in eleven specimens of *selenis* (see cut), of which ten were from Siberia.

*A. selenis* occurs in the Ural Mountains, and in various parts of Central and Eastern Siberia to the Lower Amur. The eastern form is rather larger and darker in colour, and has been separated by Erschoff as var. *sibirica*, but I have not seen sufficient specimens from the Ural to say

\* The dark patch in the cut is really pale yellowish, and rather exaggerates the difference between the species, being made from a rough sketch of my own, and not from the actual specimens.

whether this difference is constant. I agree with Graeser in thinking that it is better placed near *chariclea* and *freijsa* than before *selenis*, where Staudinger arranges it.

*A. angarensis* is very close to *selenis* var. *sibirica*, and perhaps can only certainly be distinguished in the male sex by the row of silvery white marks on the border of the hind wing below. The female, however, of which sex I have four perfect specimens, seems paler in colour and rather larger than the corresponding sex of *selenis*. Graeser, who has taken both in abundance, does not question their distinctness.

*A. freijsa* is a species of immensely wide range, but which does not seem to vary in the least, six pairs taken by me in the Yellowstone Park being indistinguishable from average Lapland and Swedish specimens. Its range, however, differs much in the Old and New Worlds, for whereas in Europe it is not found south of  $58^{\circ}$  or  $59^{\circ}$  N. in Estland, and  $60^{\circ}$  in Sweden, and extends to about  $70^{\circ}$  N. in Lapland and Siberia; in the Rocky Mountains it extends south to at least  $40^{\circ}$  in Colorado, and is not known to occur farther north than Fort Simpson, about  $62^{\circ}$  N. The difference in climate and vegetation of the two continents at similar latitudes must explain this, and only the presence of the continuous high range of the Rocky Mountains can account for its extending so far to the south in Colorado. The form described as *tarquinius* is, I think, only a smaller darker arctic var., which occurs also in British Columbia.

*A. amathusia*.—A well-known and little-varying species, as far as my experience goes; but I possess no eastern or Asiatic specimens. Russian specimens, however, are paler and somewhat smaller than Swiss ones, as are some from the Italian valleys of the Western Alps. Schilde, in his paper on Finland butterflies, Stett. Ent. Zeit., 1873, p. 176, says that *freijsa*, *chariclea*, and *amathusia* hold as near a relationship to each other as *aphirape*, *ossianus*, and *tricularis*, and that he finds only trifling differences between the two latter; but I cannot at all agree with this, as *amathusia* is fully as distinct and more easy to separate, than many species in this group; and if it was, as he seems to suggest, the alpine representative of either *chariclea* or *freijsa*, would probably have retained its place only in the highest and coldest part of the Alps, whereas it flies in grassy glades among

bushes at 3—4000 ft.; and though I have taken it as high as 6000 ft. in the French Alps, its range is usually much lower; Meyer-Dur says not above 4500 ft.

*A. frigga* is another circumpolar species of very similar distribution to the last, and varying much in size and markings of the under side below. Labrador specimens, as well as the few I have seen from Colorado and Hudson Bay, may usually be distinguished by the whitish or yellowish markings of the hind wing below (except the patch nearest the costa, which even in the form *improba* remains whitish) being partially or completely obscured by the reddish brown of the ground colour. *Improba* is an extreme arctic form, which, strange to say, exists in as widely remote localities as Nova Zembla and Arctic America, and shows, in its small size and dark colour, the same influences of a cold and bad climate, as is shown by other arctic Lepidoptera, but the markings and pattern are so nearly identical with those of *frigga* that hardly anyone but Mr. Butler could have described this highly interesting form without alluding to the existence of what even he must allow is an extremely near ally.

*A. dia* is a species which varies little, and is too well known to require much remark.

*A. bellona*\* is an American species, which occurs frequently in many parts of the Northern United States and British America east of the Rocky Mountains, and extends to British Columbia, whence there is a specimen in the British Museum: *epithore* replaces it in most places on the Pacific coast, and is by Edwards considered distinct, though I incline to Strecker's view that it is only a variety. It may generally be recognised by the paler colour, less heavily marked with black at the base of the wings, and the rather less produced apex and less angled outer margin of the fore wings. I have not seen the variety named *kreimhild* by Strecker, which appears to be found in the dryer parts of the Rocky Mountains from Utah to Arizona. From the description it would seem to be a local race of *epithore*, as Edwards thinks.

*A. thore* is a distinct species, rare and somewhat local

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\* Mead says that "the larva of *bellona* resembles more closely that of *cybele* than that of *myrina*," thus affording additional evidence of the artificial character of the genus *Brenthis*, erected to contain these smaller Argynnides. He includes both *bellona* and *epithore* in his list from Colorado.

in the Alps, where it occurs at 3—6000 ft., and, as far as I have seen, in shaded valleys on the edge of pine and larch woods, where it settles on the flowers of the rhododendron. In Jemtland, and on the Dovrefield, a form occurs which is intermediate between the dark alpine and the pale Lapland and eastern variety *borealis*.

*A. amphilochnus* is a very distinct species, which seems to have no near allies in Europe or Asia, and is, as far as yet known, confined to a limited district near the watershed of the Upper Amur.

*A. astarte* is an almost unknown species, which was discovered in some part of British Columbia (perhaps on the Cascade Mountains) many years ago, by some of Lord Derby's collectors. The type is in the British Museum, and seems to have been overlooked both in Strecker's and Edwards' catalogues, probably because the locality is incorrectly given in Kirby's catalogue as Jamaica. It has never been since found by any entomologist, and seems to me a species quite distinct from any other in North America, and most nearly allied to *amphilochnus*.

*A. ino* varies little except in size, and I should not have said that the var. *amurensis* is a well-marked form; but as both Staudinger and Graeser, who have seen it in hundreds, say that independently of its usually, but not always much greater size, it can be recognised by the different colour of the under side of the hind wing, I retain the varietal name against my own opinion, which is based on the examination of a much smaller number of specimens. Excepting by de l'Orza, *ino* has not been recorded from Japan, but there are three specimens in Mr. Godman's collection, taken by Jonas at 5000 ft., which are certainly nothing else; and Mr. Leech has also three specimens from Oiwake, Japan, taken by Pryer.

*A. daphne* is another species of very wide range, which does not vary much except in its extreme eastern range, and there in very much the same way as the last. I am not at all sure that the Japanese and Amur form can be constantly recognised, as I have not a long series of either, but those I have from Japan, Amurland, and Korea, all agree in being somewhat larger, the outer margin of the fore wing a trifle less rounded, and the under side of the hind wing somewhat greyer and less violet than the average of European specimens.

*A. hecate* is a species of somewhat limited range in Europe, but occurs in Western and Central Asia, and seems to vary little. Staudinger's var. *caucasica* is not recognised in the Grand Duke Romanoff's list of Caucasian butterflies, and those specimens I have from Amasia and Armenia agree perfectly with Hungarian examples; so I think this name may be dropped.

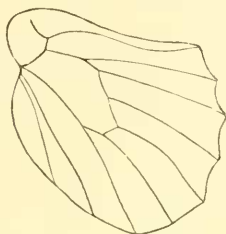
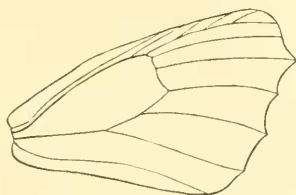
*A. lathonia*.—A re-examination of my long series of this species has led me to modify the opinion I formerly held that the Himalayan form was not to be distinguished from the European. Unfortunately I am unable to compare a series of specimens from Central Asia, where, according to Alpheraky, it is rare, and I therefore cannot say to which form those belong. Alpheraky only says "perhaps a little paler than European specimens." The Himalayan form, however, can be distinguished by the silver patches in the cell of the hind wing below, being lanceolate or rather pointed towards the outside, and angled towards the costa instead of oblong, as in European specimens. This character fails partially to distinguish about four of my forty specimens. A more constant and better distinction is the form of the silver patch at the abdominal angle, which extends in the Himalayan examples in a band of diminishing breadth, almost to the end of the lanceolate patch above mentioned, where, as in the European specimens, it never extends beyond the first median nervule (vein 1, apud H.-S.). As a rule also, the Himalayan specimens are larger and rather paler in tint on the upper side. The species has not yet been found anywhere in Eastern Asia, China, or Japan, but is common in Sikkim and the North-west Himalaya. It does not seem that the name *isæca*, which was attributed to Doubleday by Gray, was ever used by him in print, and I think no description of it has been published. De Nicéville, relying on myself, uses the name *lathonia* for the Himalayan variety.

The synonymy of the Chilian species of *Argynnis* is somewhat involved.\* Butler and Reed do not agree in

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\* Berg, in the 'Annals of the Argentine Society' for 1882, gives a full synonymy, which he says is based on an examination of the typical specimens of *dexamene* and *lathonioides*, and is, perhaps, more correct than mine, which was written before I had been able to get access to this paper.

their identification of Blanchard's species. Butler says that *siga* of Hübner is the northern variety of *cytheris*,



× 2

*A. cytheris* : to show venation and shape of wings.

the type, which came from the Straits of Magellan. But I find specimens from Conception in Mr. Godman's collection as small as others from Puntas Arenas in the Straits, and do not think the variety is constant. Butler makes *anna* a synonym of *cytheris*, but Reed, as I think rightly, makes it the male of *lathonioides*, and says that it is



× 2

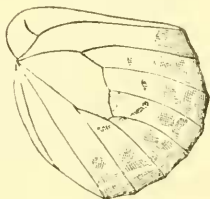
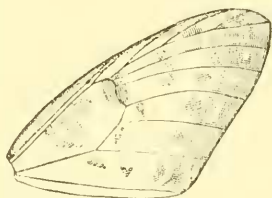
*A. modesta* : to show venation and shape of wings.

found from the Straits of Magellan as far north as the Desert of Atacama. Edmonds found it as high as

6000 ft. in the Cordillera. The sexes in this species are much more alike than in *cytheris*, and resemble the female of the latter in colour, but may, I think, be distinguished by the shape of the wings.

*A. modesta* is a small species confined to the higher mountains, and quite distinct on the under side from the other two.

The species which I have named *A. hanningtoni* is one of the most remarkable of the whole genus, both on account of its locality, which is widely separated from that of any other *Argynnis*, and on account of its peculiar



× 2

*A. hanningtoni*.

appearance, but I can see nothing in its venation, which I have here figured, or in its structure to separate it from the genus. The types are three males, taken in the forests of Taveta, near Mount Kilimanjaro, in Africa, by the late Bishop Hannington in March, 1885, and are in the collection of the British Museum.

*A. hanningtoni*, n. sp.—♂. Above, dull fawn-colour, with the base and border of wings blackish, near the margin a line of white spots, and inside them a line of black spots on both wings. Some more black spots in the interspaces and cell. Below, with no black border or base, one basal spot, a line of transverse spots, and marginal lunules dull silvery, all surrounded by reddish brown.



*A. elisa* is a well-marked species peculiar to the mountains of Corsica and Sardinia, and is, as far as I know, the only instance of such an insular development in the genus.

*A. aglaia* has perhaps the widest range of any species of the genus. It varies chiefly in size, from an average of about 1.6 in. on the Dovrefield, in Norway, to about 2.4 in. in Amurland. The females in England are sometimes very dark in colour; in hot climates, such as Southern Spain and Amurland, they are paler and greener towards the base of the wings than in ordinary European specimens. In Japan the species seems rare or local, and the only female I have is somewhat darker green on the hind wings below. In Kuldja Alpheraky says it is rare, and ascends to 10,000 ft. At Ta-Tsien-lo, in East Tibet, it seems common, but, as far as we know, it does not extend to Central China. A form has been taken in the extreme north-west of Kashmir and Ladak, *vithatha*, Moore, by Capt. Hellard and Mr. Leech, which may be considered as a good local variety, though I have not seen enough specimens to say so with certainty. It flies on the Skorolah as high as 15,000 ft. elevation, and may be recognised by its pale colour, and in the male is much less heavily marked with black than any other *aglaia* I have seen, resembling *niobe*, var. *orientalis*, very closely. The females also, on account of the pale markings of the apex and outer marking of the fore wings, resemble *niobe* more than *aglaia*, so that I had confused it with the Ladak form of *jainadera*, which was first sent me by Mr. de Nicéville as *vithatha*. But the under side is that of a true *aglaia*, and leaves little doubt of the position of this insect.

*A. nerippe* is allied to *niobe*, and is perhaps an extreme eastern development of this species; but it is so much larger, differently marked below, and constant to its type that I was clearly mistaken in putting it down as a variety of *adippe* in my list of the butterflies of Japan, being partly misled by a Korean specimen in which the median vein seemed somewhat dilated. Mr. Leech, who took large quantities in Korea, holds the opinion, in which I fully agree, that *coreana* is the same as *nerippe*, and a distinct species from either *niobe* or *adippe*. I have seen a specimen of *coreana* from Japan, taken by Jonas, in Mr. Godman's collection.

*A. niobe* is a very wide-ranging species, which varies extremely on the under side, and has developed two or three varieties which are certainly well-marked, and, as far as I know, constant in Asia; but I have not seen enough of either *orientalis* or *gigantea* to speak with certainty of them.

*A. jainadeva*, however, the Himalayan form, may, I think, be regarded as a good species, which seems to me as near to *aglaia* as to *niobe*. It resembles *niobe* most on the upper side, especially in the female sex, but differs constantly on the under side in having the hind wing of a greenish tinge towards the base, as in *aglaia*, with the silver spots of the same, but with the addition of a row of three (sometimes four or five) rufous spots, of which two or three are pupilled with silver, between the outer and next row of silver patches. It never assumes the *eris* form of *niobe*, which seems commonest elsewhere, and out of thirteen males and nine females I have none which cannot be distinguished from *niobe*, of which I have forty from various localities. *Jainadeva* occurs in the north-western parts of the Himalayas only; and in the dryer climate of the northern valleys and Ladak assumes a form which is so close to the var. of *aglaia* found near the same region, that I had for a long time confounded them under the name of *vithatha*.

*A. adippe* is one of the most variable species; several forms have been included under varietal names by Staudinger, and others described by Butler, but none of them seems to me to be capable of exact definition, and none of them are confined to a particular region, so far as I know. In Japan, Korea, and Amurland all the named forms occur, and Leech says others quite as distinct are also found. As a rule, the eastern and southern specimens are larger, brighter, and the females often darker and more tinged with green, than the European ones. In all my forty male specimens the first median nerve of the fore wing appears strongly dilated for about one-third of its length, and in all but a few specimens from Amurland and Korea the second median vein also seems dilated to a less but usually well-marked extent.

The apparent dilatation of the median veins in several species of *Argynnis* is not, as Mr. Jenner Weir has pointed out to me, a fact. It is really due, as Mr.

Scudder has well shown in his 'Butterflies of New England,' t. 44, fig. 4, to the presence of dark scales of unusual size, which conceal the so-called androconia ("federbuschschuppen," apud Aurivillius), which are long scales fringed at the end in the four species figured by Scudder on Plate 46. As these scales are not removed from the wing by Mr. Waterhouse's process of desquamation, I was led to the belief that an actual thickening of the vein took place; but Mr. Weir has shown me entirely desquamated wings of *A. atlantis*, *paphia*, and *adippe*, which prove the correctness of his view. There is an admirable account of the formation and clothing of these veins, with figures of the scales and veins, in a paper by Herr C. Aurivillius, "über Sekundäre Geschlechtscharaktere Nordischer Tagfalter," published in the 'Bihang till k. Svenska Vet. Akad. Handlingar,' Band 5, No. 25, Stockholm, 1880, P. A. Nordstedt and Sons, to which I must refer those who wish to study the question farther.

*A. laodice* is rather an eastern than a European species, but occurs throughout Russia from Sarepta and Odessa to about 60° N., and also in Eastern Germany, where in some seasons it is not very rare. In China and Japan, however, it is more abundant, and varies considerably in size and the tint of the under side. In this species the first median, and also the submedian, vein appear dilated in the males for about one-third of their length in both European and Asiatic specimens alike. The four specimens I have from Ta-t sien-lo, in East Tibet, which I owe to M. Oberthür's kindness, show in the rather broader and better marked transverse bar on the hind wing below, an approach to the next species, which their geographical position would lead one to expect, as it is evident that *A. rudra*, which is only a fixed local race of *laodice*, must have come to the Khasias through the hill-region of Upper Burmah, and the unknown country east of Assam, and not through the Himalaya, where it is unknown. Its existence here, surrounded by tropical plains on all sides but one, is somewhat remarkable. It is, however, in all the specimens I have seen and taken myself, easily recognised by the unvarying breadth of this band, as well as by the much greener colour of the hind wings below, to which also the Tibetan specimens show a tendency. The clothing of

the veins in the male is not so well-marked in this species as in *laodice*.

*A. lysippe* is a perfectly good and distinct species, which seems rare both in Japan and Amurland. It has usually been known under the name of *ruslana*, Motsch., but, on referring to the description, I think that it cannot be applied to this insect. He says, "Statura, *arg. laodice* sed minor" (while Janson correctly says of *lysippe* larger). The rest of Motschulsky's description would do for any species of *Argynnis*, and there is not a word to indicate the characters by which it can easily be distinguished from *laodice*, namely, the different shape of the fore wings, shaped as in *A. anadyomene*, and the apparent dilatation of three instead of one of the veins. Another reason, which makes me think that Motschulsky had another species in view, is that he speaks of possessing "un bon nombre d'exemplaires," whilst *lysippe* seems to be always a rare insect in Amurland, as well as in Japan. Unless, therefore, the type of Motschulsky's species can be discovered, I think Janson's name must be adopted, as his description is a good and clear one. The females are larger and greenish in tint, shaped like the male, and having the same whitish spot near the apex of the fore wing, as the female of *A. laodice*.

*A. anadyomene* is allied to the last two species, but has a well-marked structural difference in one vein only, the first median, on which for fully half its length the scales are strongly raised and thickened. It seems common in China, and does not vary.

*A. paphia*, in the East of Asia, is as common as in Europe, and there increases in size, as do so many other butterflies. The females are in Japan and China seldom or never so yellow as in Europe, and the so-called aberration *valesina* is rather the type than the variety. In Europe also, in particular places and seasons, it is so common that it is rather an instance of dimorphism than of variation. What I consider a real aberration is the form known as *anargyra*, Stgr., in which the hind wings are without silver bands below; but such forms are hardly worthy of scientific names, for if once recognised they may be multiplied to any extent, and are rather a prize for collectors than of interest to scientific naturalists. *A. paphia* has the scales of all three

median veins, as well as the submedian vein, thickened in the males, but only on the first median are they much raised.

*A. pandora* and *A. kamala* are species which require little notice, as neither of them vary appreciably. In both of them the first and second median veins seem dilated in the male.

*A. childreni* is the largest and most beautiful of all the Old World species. It extends from the North-west Himalayas as far east as Ichang, in Central China, and varies but little, specimens from the North-west Himalaya being somewhat smaller, paler, and the females greener in tint than those from the Eastern Himalaya, Khasia Hills, and China. It is found from 7 to 10,000 ft. in the North-west, but in the Khasias 4 to 6000 ft. is its zone of elevation. I have taken it on grassy places near woods, but not in forest-country. It has the first and second median veins in the male heavily scaled.

*A. sagana* is quite peculiar, on account of the remarkable difference between the two sexes, which lead to the female being first described under another name. It seems, however, to have close affinity with the last group, the first median vein being clothed in the same manner; while in some specimens the second and also the submedian seem thickened to a less extent. The species does not vary appreciably, as far as I have seen.

*A. niphe* is the only one of the whole genus, except *hanningtoni*, which has a tropical habitat. It also has the female very dissimilar to the male, and a style of marking below, not seen in any other *Argynnis*. But I can see no good reason for separating it generically, unless several other groups are also separated. The form found in Australia may be separated by its smaller size, duller colour, and the absence of the white bar in the female; it has been named *inconstans* by Butler. The Javan form resembles it in the male sex, but the female has the white band, and I have not seen specimens from any other of the Malay Islands.

The *Argynnides* of North America are, without exception, the most difficult butterflies to classify that I have ever studied. I have a collection which includes authentically named specimens of almost all the species and varieties, many of them direct from such well-known collectors as Messrs. H. Edwards and Morrison; many

others from Messrs. Strecker and Geddes. I have also seen some of the best collections in the United States, and studied all, or almost all, the large mass of scattered literature and notes on the genus by Messrs. W. H. and H. Edwards, Mead, Geddes, Scudder, and Strecker. I have repeatedly tried to construct a key by which the supposed species could be identified, and can only say that I have completely failed. I am certain that no entomologist, who received to-day the most perfect collection which could be got together from all parts of North America, and had to classify and describe them without regard to the work of others, would make anything like as many species as have been recognised. It seems presumptive for a man to set aside much of what has been written by those who have seen, both living and dead, so many more specimens than I have seen, and yet I cannot, in dealing with the American forms, adopt as specific characters so slight and variable that they would not be recognised as such in the much better known European species. And to show that it is not my ignorance alone which makes the difficulty, I may say that it is just those species which I have personally observed in life, and which I have most carefully examined, such as *A. eurynome*, *A. liliana*, *A. monticola*, and *A. meadii*, in which I have found my uncertainty the greatest. Mr. Strecker's remarks, on p. 118 of his Catalogue, are so much to the point that I will quote them here, and can only say that if our American colleagues do not agree with them, let them rather point out how others may understand their conclusions, than blame me for not adopting what I cannot see:—"The Argynnides of the western slope, or Pacific side of the Rocky Mountains, are without doubt, if we except, perhaps, the Coliades, the most difficult of all the North American Diurnæ to deal with, as they not only run into certain variations, but again into subvariations, and even further. The two species *monticola* and *zerene*, first considered identical by Dr. Boisduval, are perhaps the most perplexing; each of these bears the same relation to some of their varieties as does *niobe* to its var. *eris*, and *adippe* to *cleodoxa*, but presenting by no means the stability of forms of these European variations, but branching out into endless and endless varieties until the student is completely at a loss to know where or to what they may belong."

Scudder, in the 'Butterflies of New England,' has figured the abdominal organs of several species of *Argynnis* on Plate 33, which gives an opportunity of comparing some nearly allied species. Those of *A. cybele*, fig. 44, *A. aphrodite*, fig. 40, are very similar indeed, but as they do not appear to agree exactly with the descriptions, and the figure of that of *aphrodite* is not alluded to in the description on p. 565, I do not know whether the description was made from the same specimens figured, and whether we are to attribute the difference to variation, or to incorrect drawing. The clasper of *atlantis* (fig. 36), also much resembles those of *cybele* and *aphrodite*, but has the hook longer and nearer the clasp. The figures of the androconia of these three species (Plate 46, figs. 12, 13, 14), are also very similar, and, taken in connection with the claspers, do not lead one to suppose that very much help will be given in deciding the relationship of nearly allied species in this genus by a microscopic examination. The claspers of *A. myrina*, *bellona*, and *montinus* (Plate 33, figs. 35, 38, 42), all included by Scudder in the genus *Brenthis*, show a general similarity of form *inter se*, with the same minor differences as those of *cybele*, *aphrodite*, and *atlantis*. I at first supposed that some difference might be found in the scales clothing the median veins in the males, but on examination with a powerful lens *idalia* is the only North American species in which the raising is conspicuous, though in some specimens of *atlantis* and *aphrodite*, and others, it is clearly perceptible. The tuft of silky hairs on the subcostal nerve is present in the males of all the larger species that I have examined, and is very conspicuous in *idalia*, but I have not found it in the smaller species which have been separated under the genus *Brenthis*.

*A. idalia* and *A. diana* are two of the most beautiful species in the whole genus, and may be said to form the best links between those species of Eastern Asia, which end the Palearctic series, and the American species, which are isolated from them. *A. diana* has the sexes more different than any except *sagana*, and if the genus was divided into groups would be another instance of an American species having its nearest affinities in North-eastern Asia and Japan, of which we have several among the plants of the Alleghany Mountains.

*A. aphrodite*, *A. cybele*, *A. alecestis*, *A. cypris*, *A. halcyone*.  
—This is a group of species or forms which are extremely hard to define, and though Edwards and Scudder, and most other North American entomologists, agree in keeping them separate, I think it is very difficult, if not impossible, to identify them unless you know their habitat. I have a pretty good series of all except *cypris*, which must be very close to, if not identical with, *alecestis*, and, judging by the character of the median veins in the fore wing of the male, and by the colour and pattern of the under side, which are the best characters I know by which to define the species, I am certainly inclined to follow Strecker rather than Edwards. There have been so many mistakes made in identifying these species by collectors that their geographical distribution is not very easy to follow out; though Mr. Scudder's maps are useful, they are by no means infallible, and the northern and western range of *aphrodite* and *cybele* is certainly not defined at present. I received from Morrison a pair of *cybele* from Montana, which agree with those taken by Geddes in the North-west Territory of Canada, near Edmonton, in being smaller than those from the eastern states. According to Scudder and Edwards, however, *cybele* does not occur in Montana, and the Edmonton habitat is quite isolated; whilst *aphrodite*, which is unmentioned by Geddes in his lists of north-western butterflies in 'Canadian Entomologist,' vols. 15, p. 221, 16, pp. 56 and 224, is stated by Scudder and Edwards to occur at Edmonton. Either such experienced collectors as Morrison and Geddes did not know *aphrodite* when they saw it out of its usual range, or Scudder and Edwards are mistaken. Though it seems undoubted that typical eastern specimens of these species can be distinguished (for the points of difference see Scudder, p. 566), yet the differences are so slight that it may not be possible to identify western specimens with one or the other, and this difficulty seems to have been got over in Edwards' case by creating other species, such as *alecestis*, *cypris*, and *halcyone*, which cannot be identified with any certainty from his figures or descriptions; and which, notwithstanding all that has been written upon them, must remain, as far as I can see, "species dubiæ" to those who have not specimens identified by their author at hand for reference.



*A. leto* is a species which, though undoubtedly nearly allied to *cybele*, is fully as distinct from it as *nokomis*, and may be regarded as its Pacific coast form, in the same way as *nokomis* is the form of the dry central plateau of the continent. Though the male is not very different from the male of *cybele*, yet the female, which on the upper side is hardly distinguishable from the females of *nokomis* and *nitocris*, is marked by the strong contrast between the deep chocolate, almost black, of the base and inner area of the wings and the pale yellowish colour of the outer area. Its range extends along the Pacific coast from Central California to Washington Territory, and it is recorded also by Geddes from Fort Macleod, in the North-western Territory of Canada, on the eastern side of the mountains. Those I have from Washington Territory are considerably darker at the base of the hind wings than others from Plumas County, California; and I should not be at all surprised if a large series from different localities were to show forms intermediate both with *cybele* and *nokomis*.

*A. carpenteri* is unknown to me, except from the description, which seems to point to a form of *cybele*. It was described from two males and one female taken by Dr. Carpenter in New Mexico at a high elevation above the timber line, and is said by Mr. Edwards to be of the size of *atlantis* and near *cybele*.

*A. nokomis* and *nitocris* are regarded by Edwards, in his last catalogue, as distinct; he cites, however, Strecker's figure of *nokomis* female, in Ruffner's Report, as an aberration of *nitocris*. This is just one of those cases which prove how difficult it is to follow Edwards's authority in such matters. It so happens that I have two excellent pairs of *nokomis* from Arizona, sent by Mr. H. Edwards, which exactly agree with Mead's figure cited by Edwards. I have also a pair of *nitocris*, the male from Utah, sent by Mr. Strecker, the female from Arizona, agreeing with it, is marked by Mr. H. Edwards, "I think this species passes as *A. nitocris*, female." It differs from *nokomis* in having the under side of hind wing to the second row of spots cinnamon-colour; as in *cybele*, and is exactly intermediate between *nokomis* and *leto*. The specimen figured by Strecker in Ruffner's Report, and cited by Edwards as an aberration of *nokomis*, is, to my eye, much more like *leto* than it is to

*nitocris* or *nokomis*; and Mr. Strecker's remarks are as follows:—"The present two examples from Colorado differ notably from all those from Arizona in the following particulars: On under surface the red colour of primaries is darker, and covers evenly the whole wing except toward and at the apex; on the secondaries the whole space interior to the second of the two outer rows of silver spots, which in the Arizona examples is powdered greyish green, is deep reddish brown, nearly of the same colour as in the female of *aphrodite*, or the male of *leto*; they are larger than most of those I have seen from Arizona. On the upper side it presents no differences. I have always contended that *nokomis* was a pale abnormal form of *cybele*, of which we have so many other instances in other species from the dry salt regions of Utah and Arizona, and these intermediate examples from Colorado, with their dark reddish under sides, seem to strengthen my opinion. I can but regret that no males were captured (unless the following be really its male)\*, as I consider this is by far the most interesting insect in the whole collection."

*A. aphrodite* is a very wide-ranging species, which varies enough in the Western States to have received at least three names, for I cannot see how to distinguish *alcestis* or *halcyone* in the perfect state, though Edwards says that the larva of *alcestis* is different, and places *halcyone* in a different subgroup with *coronis*, *calippe*, and *edwardsi*, on account of the larger and more egg-shaped form of the silver spots on the under side. When, however, a good series is compared together (I have sixteen males and twelve females of this group from various States), I cannot see that his supposed distinctions are constant, and though *nausicaa*, of which I have four males and five females, taken by Messrs. Hulst and Morrison, is distinctly of a deeper red on the upper surface than any of the rest, yet its under side, like that of *halcyone*, has nothing sufficiently marked to distinguish it. Mr. Edwards perhaps would say that my *halcyone*, which were sent by Mr. Strecker, and taken near Denver, are not true to name; but what else can they be from that locality? It only shows that if a describer

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\* This is put down as *cybele* by Mr. Strecker, who is astonished at receiving it from Colorado, and is strongly inclined to the belief that it is the male of the above described form of *nokomis*.

of insects does not make his descriptions sufficiently comparative and clear to be followed by others, he must not be surprised if others refuse to accept them. Larval characters alone, which are liable to vary like those of the perfect insect, and which cannot be easily compared by others, are not in my opinion sufficient. With regard to *A. nausicaa*, however, I see a point not alluded to by Mr. Edwards, which may be sufficient to separate it, namely, the much less abundant and shorter tuft of hairs on the subcostal vein of the hind wing in the males. This tuft is prominent in all males of *aphrodite*, *alcestis*, and *halcyone* which I have examined; in *nausicaa* it is much less conspicuous, and, taken in conjunction with the isolated habitat and deeper colour, is probably enough to distinguish it.

*A. atlantis* is another species which I find it uncommonly difficult to decide about, not so much when the eastern form alone is before me, but when the numerous western species or forms have to be considered. Mr. Edwards has got over the difficulty by naming them all separately, and Mr. Scudder, though he was not perhaps obliged to mention them in the 'Butterflies of New England,' says nothing as to their very near relationship. He remarks as follows:—"There is no need of confounding this species with either of the preceding [*aphrodite* and *cybele*]: it is smaller than they, duller in tint above, has a blackish border to all the wings in both sexes, and more continuous mesial band on the upper surface of the hind wings; the darker colours of the under surface of hind wings are deeper in hue than in either of them, while the buff belt is wider than that of *aphrodite* and narrower than that of *cybele*; the buff scales on the basal half of the wing also assume more importance than in the other species; finally the costal border of the fore wings does not appear to be quite so much arched. It is possible, perhaps even probable, that this species is the true *Papilio aphrodite* of Fabricius, but as it is quite impossible to be certain of it, the names ought to stand as given by Mr. W. H. Edwards, who first clearly distinguished the species in this difficult group. The species were still confounded in the British Museum, after the publication of Butler's Fabrician butterflies, as I myself saw, and notwithstanding Butler's remarks on p. 108 of that work." Its

distribution, according to Mr. Scudder, is much the same as that of *cybele* and *aphrodite*, but extends to Newfoundland, Labrador, and the Hudson Bay Territory: on Mead's authority he also gives Colorado, but Edwards calls the form found here *electa*, which also ranges into New Mexico and Montana. Whether this is the same or not I cannot be certain, as the description of *electa* in 'Field and Forest' is inaccessible; but I have a pair from Colorado, given me by Mr. Holland (which are named *electa*, I believe, by Mr. Edwards), and a female from S.W. Colorado, taken by Morrison, which I cannot separate from *atlantis*. Mead also gives a clue to the correctness of this identification with *atlantis* by mentioning the strong musky odour of the Colorado species, a peculiarity of *atlantis* to which Scudder calls attention. Geddes says that *atlantis* occurs in all parts of the Rocky Mountains north of the American boundary which he visited, and if this is correct, it can hardly be absent from Montana and Colorado. But at the same time I must say that the male of so-called *electa* does not differ from the female as does another male from Colorado (sent by Mr. H. Edwards as *hesperis*) in having the silver spots of the under side partially obsolete. If, therefore, *hesperis* and *atlantis*, which are placed next to each other by Mead, and stated to occur at the same elevation in Colorado, run into each other, as they seem to do, we are led into the belief that *atlantis* is liable, in the west, to the disappearance of the silver spots, which takes place in other American and European species; and then there is no reason why some of the forms which occur on the Pacific States, such as *columbia*, should not also belong to *atlantis*. I do not say that they are so, because it would be unwise to do so without knowing them in nature better than I or any living American naturalist does; but on the other hand I can see nothing in the writings and figures of Mr. Edwards to prove the contrary, or to enable others to distinguish them. *A. columbia*, H. Edw., was by him considered as so near to *atlantis* that it might be only a variety of it. It was described from four males taken at Lahache, near the Alaskan border of British Columbia, and there is nothing in the description worthy of note; but, when going through Mr. H. Edwards's collection, I noted it as similar to *hesperis*.

*A. lais*, of which I have seven of the specimens from Red-deer River, from which the species was described, seems to me very near *atlantis*, but separable by the smaller size, paler colour, and apparently by the less raised scales of the submedian veins in the male. Edwards, however, says it is the size of *atlantis*, and stands between that and *aphrodite*. Geddes does not tell us how to distinguish them, but says that it was found on the prairies about Fort Edmonton, while *atlantis* occurred in the mountains.

*A. coronis* is a species which seems to have a very wide range west of the Rocky Mountains, and varies a good deal, but may be recognised in most of its forms by the large ovoid silver spots of the under side of the hind wing. It is apparently most nearly allied to *edwardsi*, with its forms *nevadensis* and *meadii*, but these differ in the longer, narrower shape of the fore wing, and do not seem to be found on the Pacific coast. There occur, however, in Nevada forms which are described as *laura* and *macaria*, of which I have authentic specimens from Mr. H. Edwards, and which, by their under sides, seem to be *coronis*; whilst *chitone*, also sent by Mr. H. Edwards from Nevada, does not agree with W. H. Edwards's description on the under side, and is nearer to *nevadensis*. None of these names can, in my opinion, be retained except as synonyms, though they are all three kept up in Mr. W. H. Edwards's 1884 Catalogue as distinct species.

Whether *edwardsi*, *nevadensis*, and *meadii* are distinct is a more doubtful question. Certainly *meadii*, which I have taken in the Yellowstone Park, looks very different from the large *edwardsi* of Colorado, but I have some from Montana, taken by Morrison, and from the N.W. Territory of Canada by Geddes, named *nevadensis*, which are perfectly intermediate in size and colour; whilst others, sent by Strecker as *nevadensis* from Colorado, resemble *aphrodite* in the colour of their hind wings below. Mead says:—“The three closely-allied species, *edwardsi*, *nevadensis*, and *meadii*, seem to be related to each other in much the same way as the eastern *aphrodite*, *cybele*, and *atlantis*. In *edwardsi* the pale submarginal band below is narrower, and sometimes almost obsolete, as in *aphrodite*, and it ranges up to greater elevations than *nevadensis*, which has this band comparatively broad in

both sexes, as we see it in *cybele*. *Meadii* differs from either in tint, especially the female; it is somewhat smaller, and probably, like *atlantis*, is exclusively confined to the mountains. The peculiar bright green coloration of the under side of secondaries in *meadii*, however, has no parallel among our fritillaries."

*A. callippe* is, in its typical form, which occurs all through the lowlands of California, a very distinct species; but *liliana* is, according to Mr. H. Edwards, intermediate between it and *coronis*, and the specimen which he sent me as typical of it does not agree with those which Mr. Godman and I took abundantly near Los Angeles, some of which Mr. H. Edwards afterwards named *liliana*, though I should certainly call them *callippe*.

*A. semiramis*, again, is a South Californian form, which has been taken by Mr. Wright in the mountains separating the San Bernadino Valley from the Mohave Desert, and of which I have six specimens from him, as it was not yet out when I visited these mountains in May, 1888. To my eye it is nothing more than a form of *coronis*, in which the black markings of the upper side have become paler and more reduced, as might be expected from the arid character of the country where it is found. Edwards says:—"It is curious how the markings resemble two such distinct species as *adiante* (upper side) and *coronis* (lower side)."

The species allied to *monticola*, namely, *zerene* and *bremneri*, have puzzled me quite as much as Edwards, Strecker, and others, and I do not see how the difficulties of their synonymy can ever be cleared up; but I can only say that, if I have not succeeded in arranging them correctly, it is not from idleness or carelessness, but on account of the impossibility of identifying species or forms described in such a way as these have been. Many of the names cannot be certainly identified, and had better be dropped. I think, however, that three more or less distinct forms can be recognised among the very numerous specimens which I have from the Pacific States. There are a larger form *monticola*, and a smaller form, which both Messrs. H. and W. H. Edwards call *zerene*, Bdv. These both vary extremely on the under side, but in *monticola* the males occasionally, and the females usually, have more or less silvery spots;

whilst in *zerene* the duller and paler colour of the under side is without any silver except on the marginal row. These distinctions, however, are based upon Californian specimens, mostly from the Shasta district, and, according to Edwards's opinion in 1879 (see Can. Ent., pp. 55—6), do not apply to Nevada specimens. He then considered *monticola* to be only a var. of *zerene*, but puts them down as two species in his catalogue of 1884. Farther north, in the damper climate of Oregon and Washington Territory, as also commonly in Vancouver's Island, a darker form, *bremneri*, occurs, which on the under side is well spotted with silver in both sexes, and might be considered as the Pacific coast form of *atlantis*; but in the specimens taken on Mount Hood by Morrison (*rhodope*, Edw.), and also occasionally in Vancouver, the silver is absent, and these specimens might well be considered as a northern and darker form of *zerene*.

*A. hippolyta*, which is also kept up by its author as a species, is described without reference to its allies, and seems to be something intermediate between *hesperis* and some form of *zerene* or *monticola*. Its locality would indicate that it may be nearer to them than to *atlantis*. It was described from four males and one female only.\*

*A. adiante* is a form which both Strecker and Edwards consider distinct, and which appears to be very local. On the coast of California, according to Strecker's information, it is now extinct, and all the male specimens (I have seen no females) in Mr. Godman's and my collection are evidently taken many years ago. But, though the markings on the under side are nearly obsolete in some cases, and in all faint compared with those of *zerene* or *monticola*, yet they seem to be quite identical, and I should certainly be inclined to set it down as a variety of one of those species. This is just a case in which one would be guided by the opinion of local collectors, but neither Mr. H. Edwards or any one else of late years seems to have mentioned this species, and the opinions held twenty-five years ago, when Dr. Behr was an active collector, are not conclusive.

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\* Mr. Strecker informs me that *hippolyta* was described from some small examples of *bremneri*, given by Mr. O. B. Johnson, of Oregon, to Mr. Dodge, of Nebraska, who gave them to Mr. W. H. Edwards. Some of the same catch and lot were also given to Mr. Strecker.

The intricacy and confusion of nomenclature among the next group of Argynnides, which inhabit the Rocky Mountains and Pacific States, is as great as among the last, but I have in this case followed Edwards's identifications of Behr's and Boisduval's species, which are supported by the named specimens sent me by Mr. H. Edwards, rather than the arrangement of Strecker's Catalogue, which makes *montivaga* and *egleis* varieties of *zerene*, Bdv. I cannot, however, follow Edwards in separating *elio* and *artonis* from *eurynome*, and Geddes, who took them in the Northern Rocky Mountains, agrees with me in considering them as synonyms. As to *opis* and *bischoffi*, I am more doubtful, having seen but few specimens; but in these, as well as in Edwards's figures I can see no specific characters, and should consider them as northern varieties, differing only, as might be expected, in rather smaller size and duller coloration. Whether *montivaga* and its var. *egleis* are really distinct from *eurynome* and its varieties is hard to say; they seem to have the fore wings rather longer and the under side less tinged with green: they may, perhaps, best be treated as the west coast representative of *eurynome*. Edwards says of *egleis* (Can. Ent., vol. ii., p. 54) that whatever the variation in other respects (and he allows it to be very variable), the spots of the second and third rows on the under side of hind wing are heavily edged with black on the basal side. But I have specimens of *montivaga*, collected by Morrison in Nevada (of which sixty were also examined by Edwards), and others from the Sierra Nevada, California, named *montivaga* by H. Edwards and Strecker, which have the same character, and in some specimens of *eurynome*, taken by myself in the Yellowstone Park, the same black edging is more or less present.

I have also specimens of *arge*, Streck., from Strecker and Mr. Holland, both from Spokane Falls and California, which are undoubtedly the same as *erinna*, which was described in 1883 as a var. of *eurynome* by Edwards, and in his Catalogue of 1884 is put down as a variety of *montivaga*. If, therefore, he is himself so uncertain of the true position of these forms, he cannot expect others to follow him blindly, and though many years must elapse before any certain conclusion will be come to, I venture to think that the arrangement I have adopted



represents the facts shown by my collection, including about fifty specimens from all the States where the species occurs, and from many of the collections which supplied his own materials. If it should eventually prove that the Pacific coast form is not separable from the Rocky Mountain form *montivaga*, it may be better to use the name *eurynome* in preference to *montivaga* or *egleis*, because both Behr's and Boisduval's descriptions, which have priority over Edwards's, can only be identified with doubt. My specimens of *montivaga* and *egleis* all come from the Sierra Nevada, and not from the Mt. Shasta district, where *monticola* and its vars. are so abundant; but local information as to their distribution in this, as in other cases, is very deficient.